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Plate Tectonics Boundaries Exercise

Objective: through examination of real-world data discover the properties of tectonic plate boundaries. Develop skills of observation, communication, and scientific reasoning.

Materials: You will bring this printed exercise, colored pencils. Do all work in pencil not pen so you can easily revise. Your instructor will provide data maps, map overlays.

Write only on your “Plate Boundary Maps”. Do not write on the data maps!

Introduction: You will examine global data of four types that relates to plate tectonics; seismology, topography, volcanology, and geochronology. All the maps have the same scale and projection so they can be easily compared or overlaid. If you do not understand the symbols or colors on the maps ask for help.

In Phase 1 we will divide into Scientific Specialty groups. Each group will examine a particular data map and become local experts about that map. Through observation your group will develop a classification scheme with up to five different types of plate boundaries as represented in the data of you map.

Scientific Specialties:

- Seismologists will use the Earthquake map
- Volcanologists will use the Volcano map
- Geochronologists will use the Seafloor Age map
- Geographers will use the Topography/Bathymetry map

In Phase 2 we will form new groups composed of a specialists for each type of data. Each expert will brief the other group members on their results from Phase 1. Each group will then closely examine the boundaries of one tectonic plate and synthesize the data from all their experts.

Phase 1: Becoming a Scientific Specialist

In this phase you will work with others to become the expert on one of four data types. Later you will brief others on your area of expertise, so participate and take good notes.

Look at your group's map and talk about what you see. What you look for will depend upon the data type. For the point data (volcanoes and earthquakes) you are looking for distribution patterns. For surface data (topography and seafloor age) you are looking for where the surface is high and where it is low, where it is old and where it is young. Work as a group. Let everyone talk about what they see.

Procedure:

- Make sure you understand what your map data means. Use you personal plate boundary sheet to see where the boundaries are relative to your data map.
- This step emphasizes observation – resist the temptation to start interpreting the data (say what it means or draw conclusions).

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- Your main task is to develop a classification scheme for global plate boundaries based on your data map. Your schema may have up to 5 plate boundary types. Give each type a number such as boundary type 1, boundary type 2, etc. Don't yet try to use fancy geologic terminology! Rather, use common descriptive words like wide or narrow, many or few, straight or curved, symmetric or asymmetric, deep or shallow, ridge or valley, young or old, and active or inactive, etc.
- Start by picking an interesting looking boundary area. Fully describe it then find other boundaries that seem to fall into the same category.
- On a separate sheet, write a description of the characteristics of each plate boundary type. It should be clear enough that someone unfamiliar with their map, and without help, could use each description to find examples of that boundary type on the map.
- Assign each boundary type a different color then use a colored pencil to mark on your personal map all plate boundaries in the world which fit each description. If there is some asymmetry (something on one side of the boundary and not the other) devise some way to show that on your personal map.
- Continue doing this until all the plate boundaries are assigned to one of your types.
- When finished you will have two sheets of paper; your map with color-coded boundary types and another sheet with the boundary descriptions.

Phase 2: Data Synthesis – Focus on one plate

In Phase 2 we will form new groups made up of at least one local expert for each type of data. Each group will be assigned a specific tectonic plate. Focus your attention on the plate boundaries. At this point, do not try to explain the data; just observe!

Procedure

- Each group will closely examine the boundaries of one tectonic plate using the maps provided and synthesize the data from all their experts.
- Each expert will brief the other group members on their data and their classification scheme. What were the criteria that you used to divide the boundaries into logical categories? How did they differ? Which are most common?
- Develop a new unified scheme for classifying boundaries that takes all the data into account. Give each type a label such as boundary type A, boundary type B, etc. Restrict yourselves to about 4-5 boundary types.
- As before, on a separate sheet, write a description of the characteristics of each plate boundary type. It should be clear enough that someone unfamiliar with their map, and without help, could use each description to find examples of that boundary type on the map.
- Also as before, assign each boundary type a different color then use a colored pencil to mark on your second personal map all plate boundaries in the world which fit each description. If there is some asymmetry (something on one side of the boundary and not the other) devise some way to show that on your personal map.
- Be prepared to describe and explain your findings to the rest of the class.

✓ You will turn in four pages; two summary pages and two map pages.

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1) Summary of Plate Boundary Types – Data Type Specialist Group

Color	Type 1: _____

Color	Type 2: _____

Color	Type 3: _____

Color	Type 4: _____

Color	Type 5: _____

Continue on the back if you need more space.

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2) Summary of Plate Boundary Types – Plate Boundary Group

Color	Type A: _____

Color	Type B: _____

Color	Type C: _____

Color	Type D: _____

Color	Type E: _____

Continue on the back if you need more space.

PLATE BOUNDARY MAP

This map is from Dietmar Mueller, Univ. of Sydney

This map is part of "Discovering Plate Boundaries," a classroom exercise developed by Dale S. Sawyer at Rice University (dale@rice.edu). Additional information about this exercise can be found at <http://terra.rice.edu/plateboundary>.

(#1 Data Specialist) NAME: _____

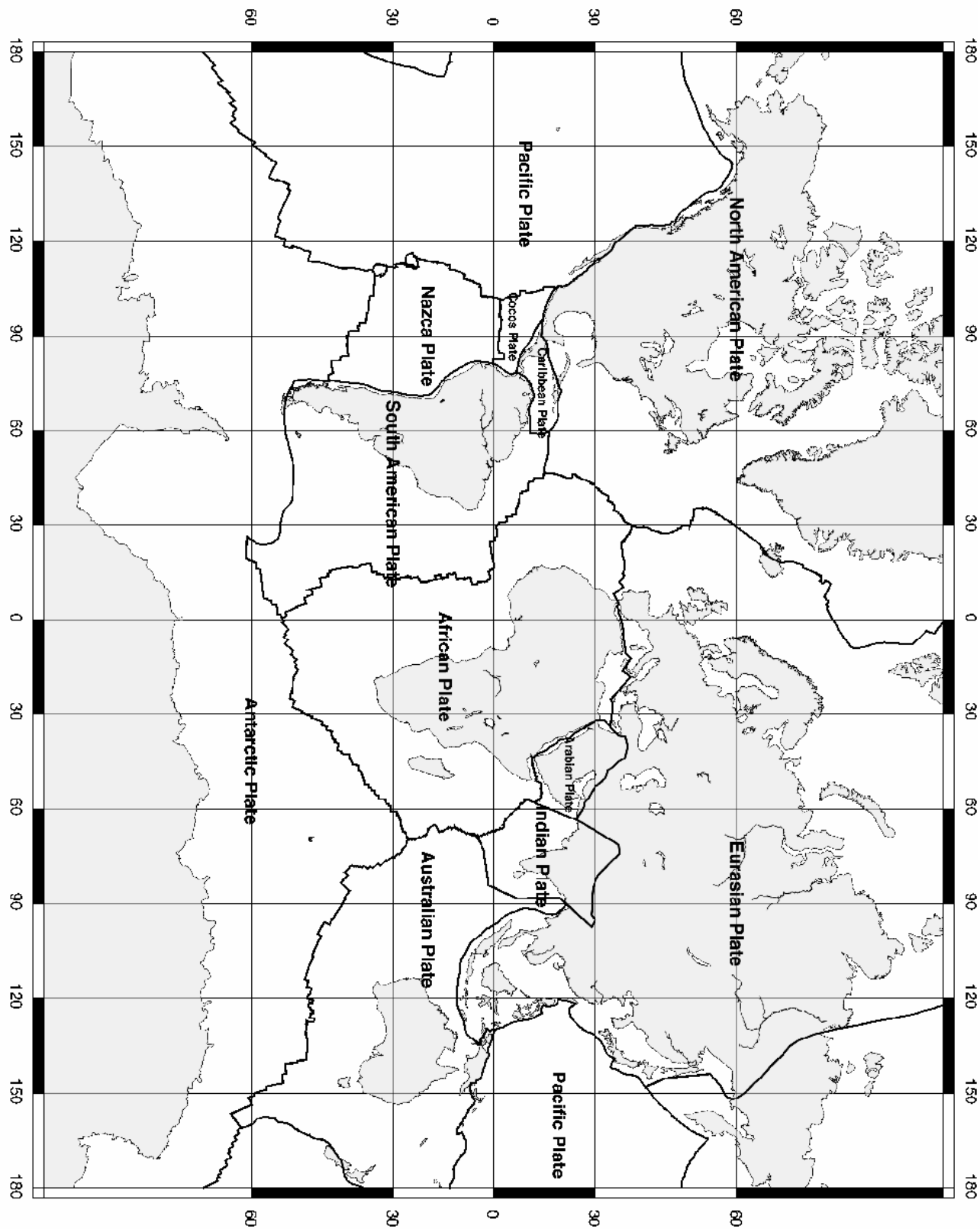


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(#2 Synthesis) NAME: _____

